FIG.1

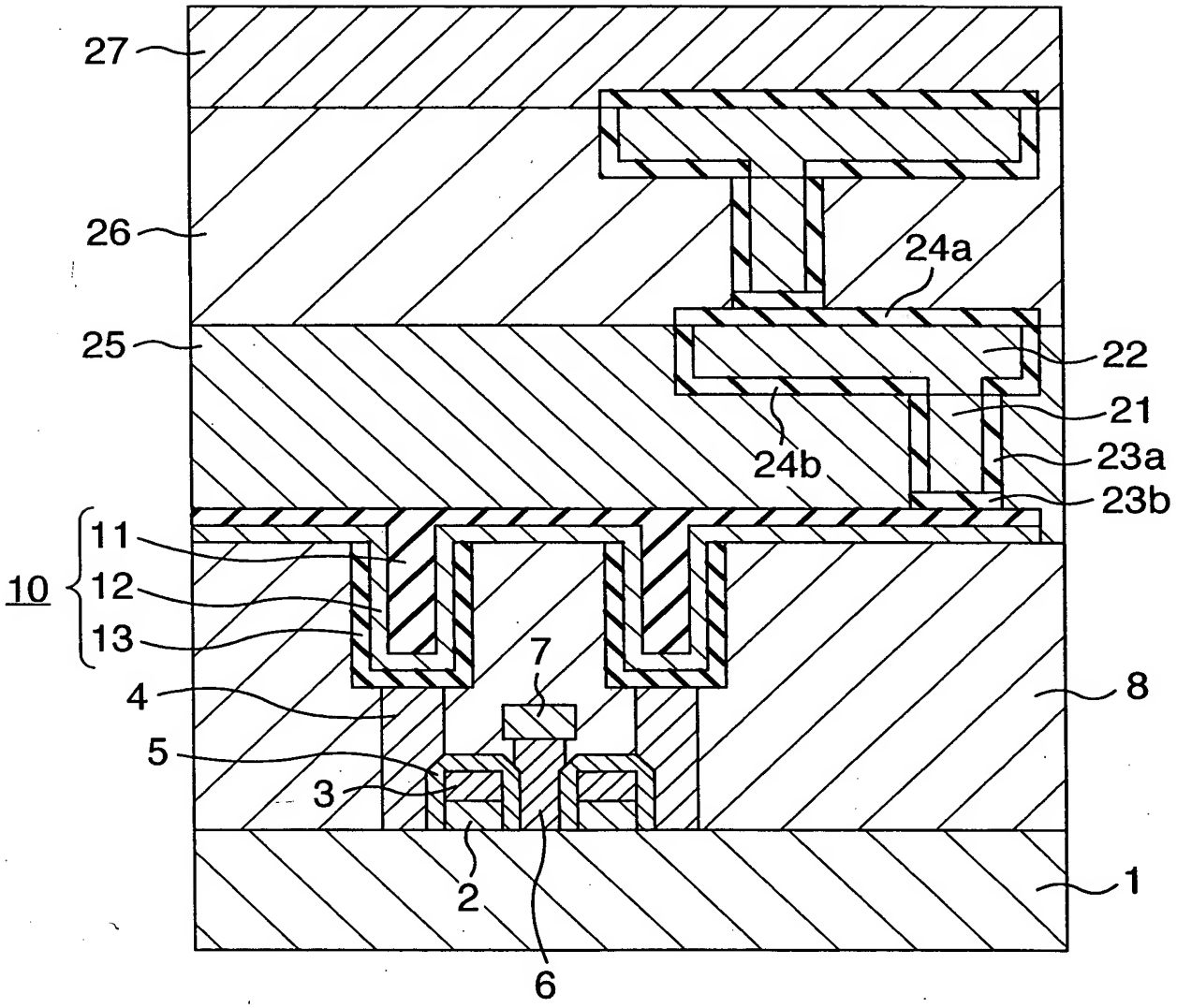

FIG.2

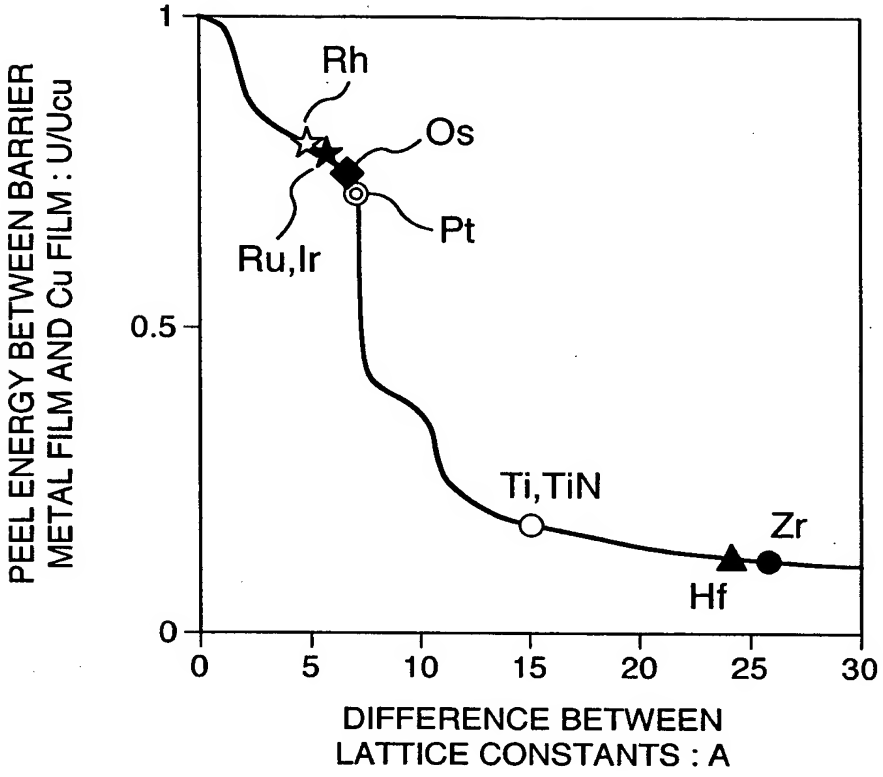
PEEL ENERGY BETWEEN BARRIER METAL FILM AND Cu FILM : U/Ucu
1
0.5
0
Rh
Os
Pt
Ru,Ir
Ti,TiN
Zr
Hf
0
5
10
15
20
25
30
DIFFERENCE BETWEEN LATTICE CONSTANTS : A

FIG.3

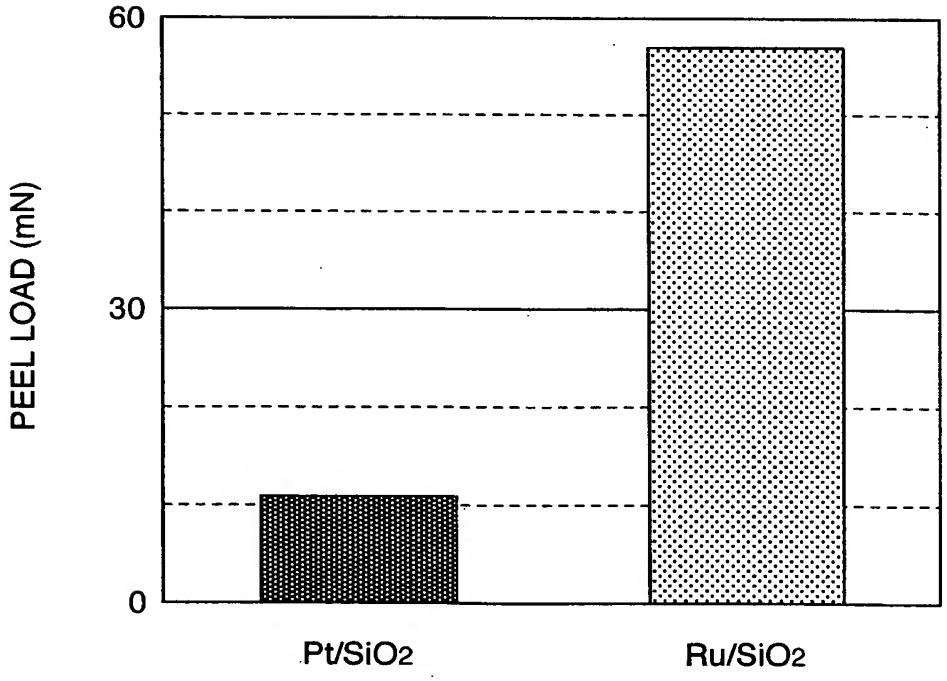
PEEL LOAD (mN)
60
30
0
Pt/SiO2
Ru/SiO2

FIG.4

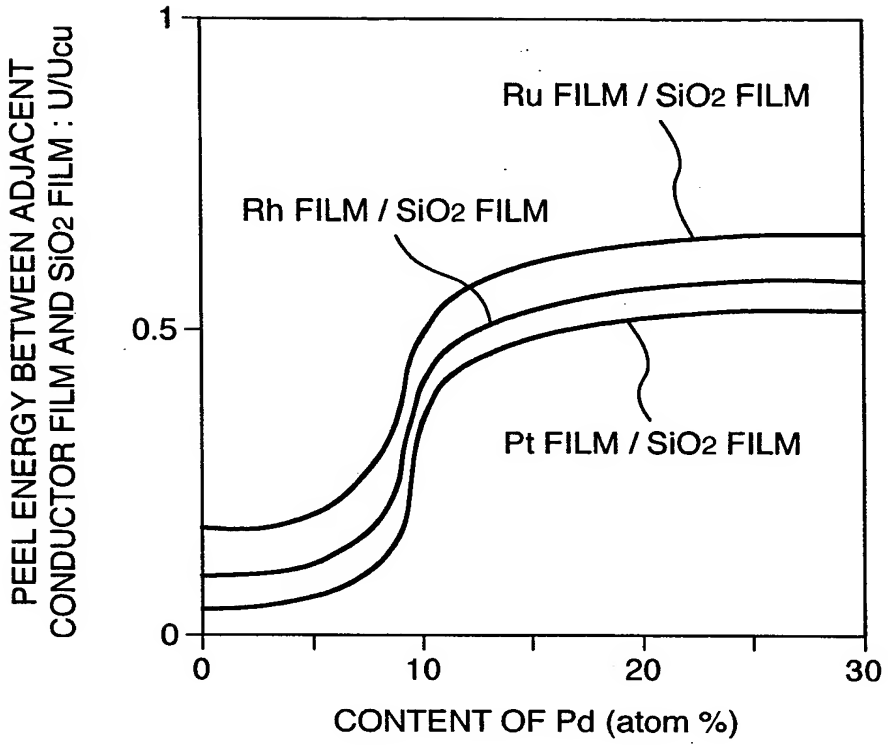
PEEL ENERGY BETWEEN ADJACENT CONDUCTOR FILM AND SiO2 FILM : U/Ucu
1
0.5
0
Ru FILM / SiO2 FILM
Rh FILM / SiO2 FILM
Pt FILM / SiO2 FILM
0
10
20
30
CONTENT OF Pd (atom %)

FIG.5

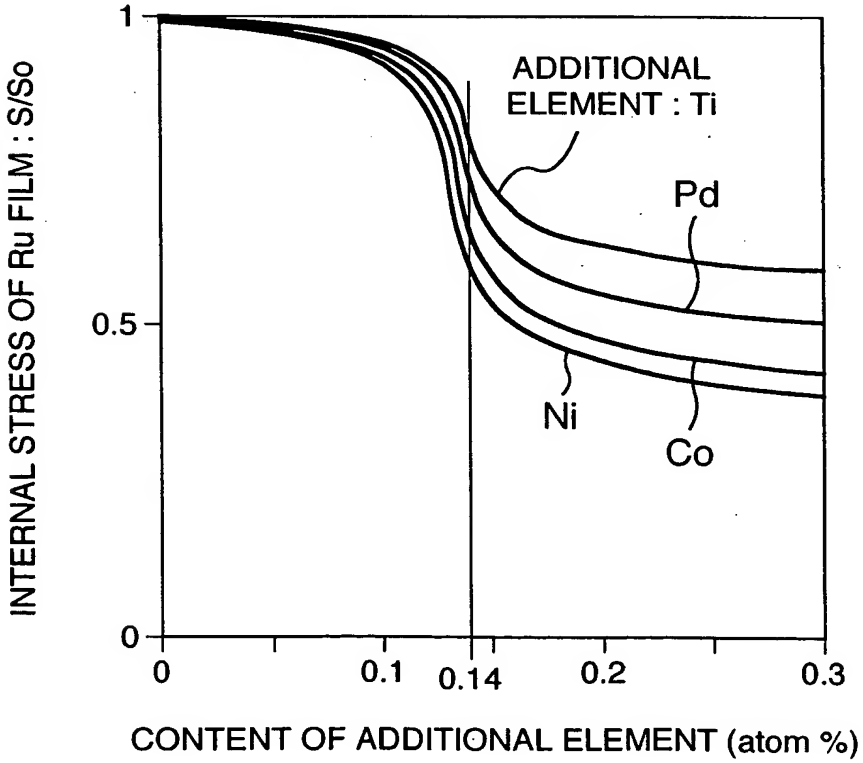
INTERNAL STRESS OF Ru FILM : S/So
1
0.5
0
ADDITIONAL ELEMENT : Ti
Pd
Ni
Co
0
0.1
0.14
0.2
0.3
CONTENT OF ADDITIONAL ELEMENT (atom %)

FIG.6

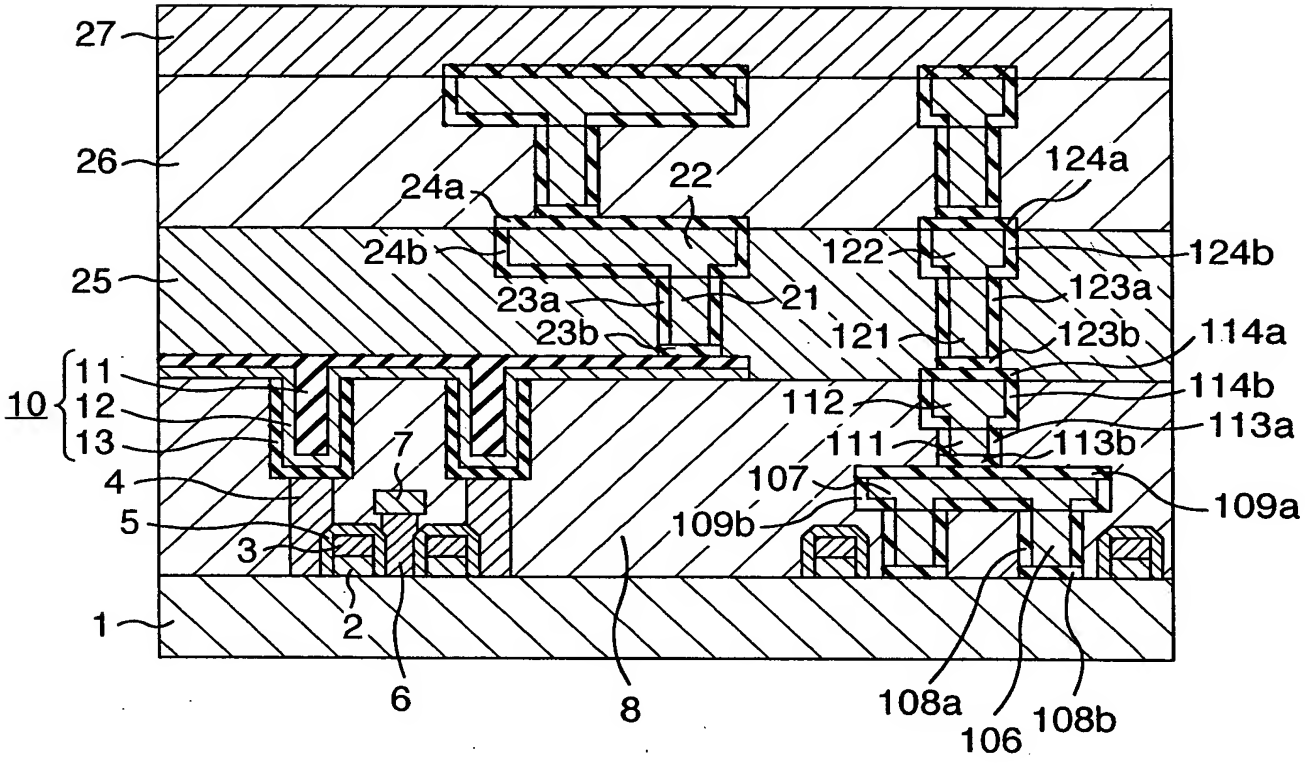
27
26
25
10
11
12
13
4
5
3
1
2
6
8
7
24a
22
24b
23a
23b
21
124a
122
124b
123a
121
123b
114a
114b
112
113a
111
113b
107
109a
109b
108a
106
108b

FIG.7A

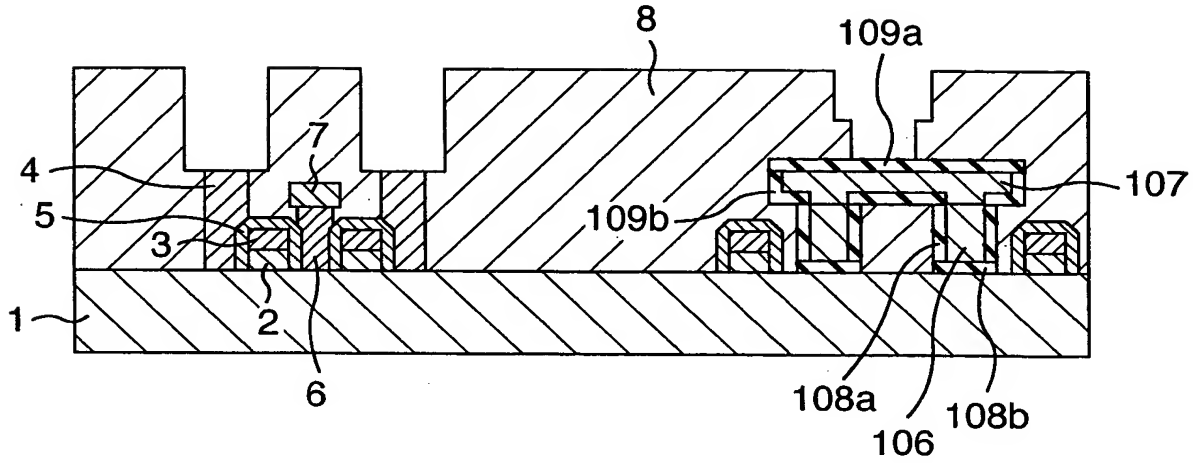

FIG.7B

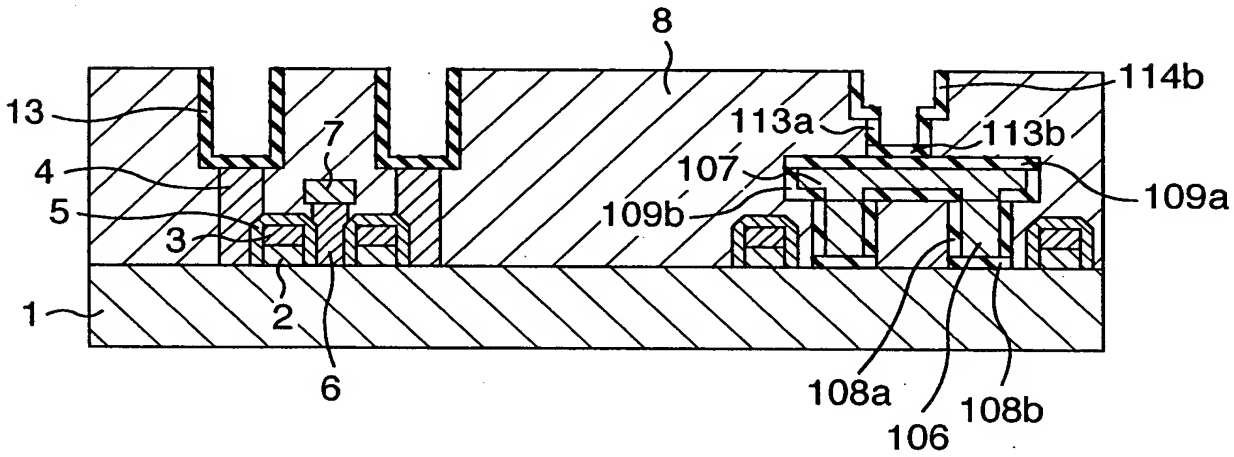

FIG.7C

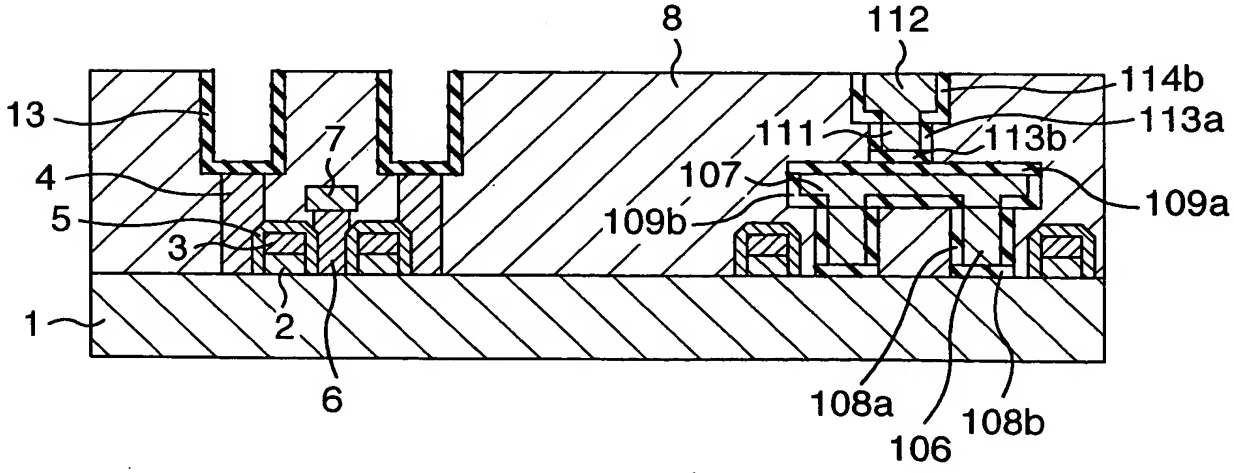

FIG.8A

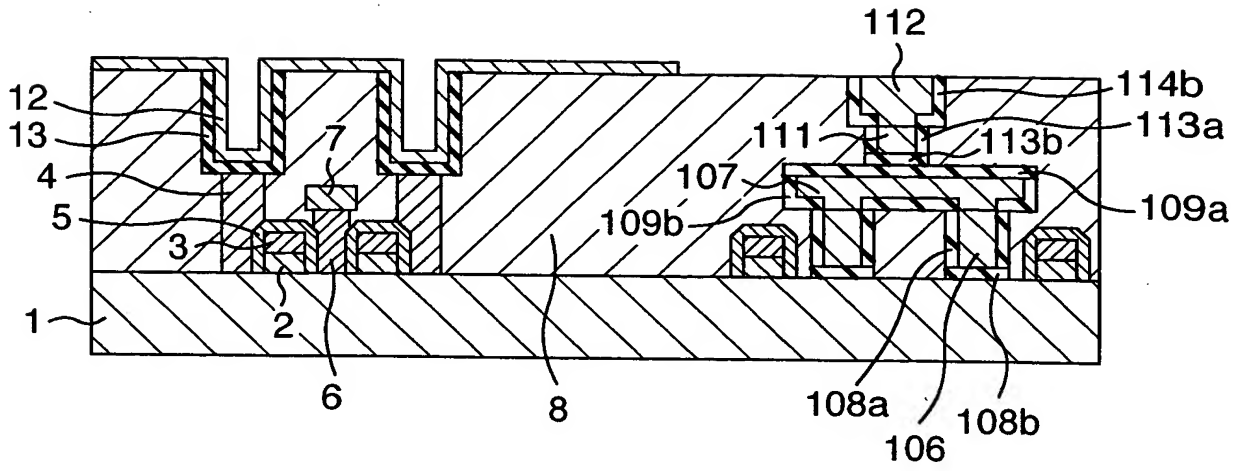

FIG.8B

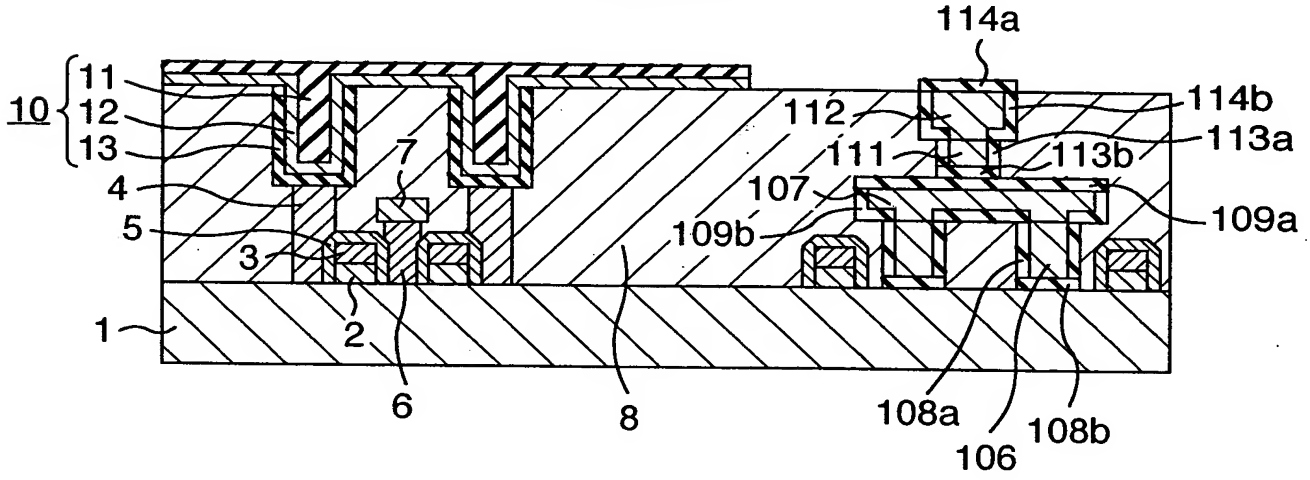

FIG.8C